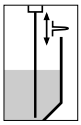
Operating Instructions

VEGAFLEX 67

-40 … +150 °C, PFA partly insulated

Profibus PA

Guided Microwave



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Supplementary documentation

Information:
Supplementary documents appropriate to the ordered version come with the delivery. You can find them listed in chapter "*Product description*".

Instructions manuals for accessories and replacement parts

Tip:
To ensure reliable setup and operation of your VEGAFLEX 67, we offer accessories and replacement parts. The associated documents are:

- 27720 - VEGADIS 61
- 30207 - Electronics module VEGAFLEX series 60
- 31088 - Flanges according to DIN-EN-ASME-JIS-GOST
- 30391 - Spacer

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1 About this document

1.1 Function

This operating instructions manual provides all the information you need for mounting, connection and setup as well as important instructions for maintenance and fault rectification. Please read this information before putting the instrument into operation and keep this manual accessible in the immediate vicinity of the device.

1.2 Target group

This operating instructions manual is directed to trained personnel. The contents of this manual should be made available to these personnel and put into practice by them.

1.3 Symbolism used

Information, tip, note
This symbol indicates helpful additional information.

Caution: If this warning is ignored, faults or malfunctions can result.
Warning: If this warning is ignored, injury to persons and/or serious damage to the instrument can result.
Danger: If this warning is ignored, serious injury to persons and/or destruction of the instrument can result.

Ex applications
This symbol indicates special instructions for Ex applications.

• **List**
The dot set in front indicates a list with no implied sequence.

→ **Action**
This arrow indicates a single action.

1 **Sequence**
Numbers set in front indicate successive steps in a procedure.

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2 For your safety

2.1 Authorised personnel

All operations described in this operating instructions manual must be carried out only by trained specialist personnel authorised by the plant operator.

During work on and with the device the required personal protection equipment must always be worn.

2.2 Appropriate use

VEGAFLEX 67 is a sensor for continuous interface measurement in liquids.

You can find detailed information on the application range in chapter "*Product description*".

Operational reliability is ensured only if the instrument is properly used according to the specifications in the operating instructions manual as well as possible supplementary instructions.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden.

2.3 Warning about misuse

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel overfill or damage to system components through incorrect mounting or adjustment.

2.4 General safety instructions

This is a high-tech instrument requiring the strict observance of standard regulations and guidelines. The user must take note of the safety instructions in this operating instructions manual, the country-specific installation standards as well as all prevailing safety regulations and accident prevention rules.

The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for trouble-free operation of the instrument.

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During the entire duration of use, the user is obliged to determine the compliance of the required occupational safety measures with the current valid rules and regulations and also take note of new regulations.

2.5 Safety approval markings and safety tips

The safety approval markings and safety tips on the device must be observed.

2.6 CE conformity

The protection goals of the EMC Directive 2004/108/EC (EMC) and the Low Voltage Directive 2006/95/EC (LVD) are fulfilled.

Conformity has been judged according to the following standards:

EMC: EN 61326-1: 2006
(electrical instruments for control technology and laboratory use - EMC requirements)

- Emission: Class B
- Susceptibility: Industrial areas

LVD: EN 61010-1: 2001
(safety regulations for electrical measurement, control and laboratory instruments - part 1: General requirements)

2.7 Fulfilling of NAMUR recommendations

With respect to interference resistance and emitted interference, the NAMUR recommendation NE 21 is fulfilled.

With respect to compatibility, the NAMUR recommendation NE 53 is fulfilled. This applies also to the corresponding indicating and adjustment components. VEGA instruments are generally upward and downward compatible.

- Sensor software for DTM VEGAFLEX 67 HART, PA or FF
- DTM VEGAFLEX 67 for adjustment software PACTware
- Indicating and adjustment module for sensor software

The parameter adjustment of the basic sensor functions is independent of the software version. The range of available functions depends on the respective software version of the individual components.

The software version of VEGAFLEX 67 can be determined as follows:

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- via PACTware
- on the type label of the electronics
- via the indicating and adjustment module

You can view all software histories on our website www.vega.com. Make use of this advantage and get registered for update information via e-mail.

2.8 Safety instructions for Ex areas

Please note the Ex-specific safety information for installation and operation in Ex areas. These safety instructions are part of the operating instructions manual and come with the Ex-approved instruments.

2.9 Manufacturer declaration for zone 2

In conformity with DIN EN 60079-15/2005 VEGAFLEX 67 is suitable for use in zone 2.

The operator must use the instrument as it was intended to be used and follow the specifications of the following documents:

- this operating instructions manual
- the manufacturer declaration 32906 (download under "www.vega.com")
- the applicable installation regulations

2.10 Environmental instructions

Protection of the environment is one of our most important duties. That is why we have introduced an environment management system with the goal of continuously improving company environmental protection. The environment management system is certified according to DIN EN ISO 14001.

Please help us fulfil this obligation by observing the environmental instructions in this manual:

- Chapter "*Packaging, transport and storage*"
- Chapter "*Disposal*"

3 Product description

3.1 Configuration

Scope of delivery

The scope of delivery encompasses:

- VEGAFLEX 67 level sensor
- Documentation
  - this operating instructions manual
  - Operating instructions manual 27835 "*Indicating and adjustment module PLICSCOM*" (optional)
  - Supplementary instructions manual 31708 "*Heating for indicating and adjustment module*" (optional)
  - Supplementary instructions manual "*Plug connector for continuously measuring sensors*" (optional)
  - Ex-specific "*Safety instructions*" (with Ex-versions)
  - if necessary, further certificates

Components

VEGAFLEX 67 consists of the following components:

- Process fitting with probe
- Housing with electronics
- Housing cover, optionally available with indicating and adjustment module

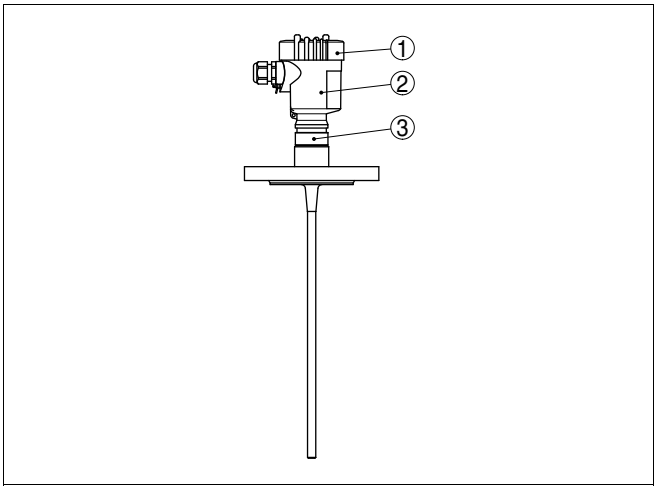

Fig. 1: VEGAFLEX 67 - rod version with plastic housing
1 Housing cover with integrated indicating and adjustment module (optional)
2 Housing with electronics
3 Process fitting

Type label

The type label contains the most important data for identification and use of the instrument:

- Article number
- Serial number
- Technical data
- Article numbers, documentation

With the serial number, you can access the delivery data of the instrument via "www.vega.com", "*VEGA Tools*" and "*serial number search*". In addition to the type label outside, you can also find the serial number on the inside of the instrument.

3.2 Principle of operation

Application range

VEGAFLEX 67 is a level sensor with rod or cable probe for continuous interface measurment.

It is designed for industrial use in all areas of process technology and can be used in liquids.

Functional principle

High frequency microwave impulses are guided along a steel cable or rod. When reaching the product surface, a part of the microwave impulses is reflected. The other part passes the upper product and is reflected a second time by the interface. The running times to the two product layers are processed by the instrument.

Prerequisites for interface measurement

Upper medium (L2)

- The upper medium must not be conductive
- The dielectric value of the upper medium must be known (input necessary). Min. dielectric values: Rod version 1.7. You will find a list of the dielectric values on our homepage: www.vega.com
- The composition of the upper medium must be stable, no varying products or mixtures
- The upper medium must be homogeneous, no stratifications within the medium
- Min. thickness of the upper medium 100 mm
- Clear separation from the lower medium, no emulsion phase, no mull layer
- If possible, no foam on the surface

Lower medium (L1)

- The dielectric value must be 10 higher than the dielectric value of the upper medium, preferably electrically conductive. Example: upper medium dielectric value 2, lower medium at least dielectric value 12

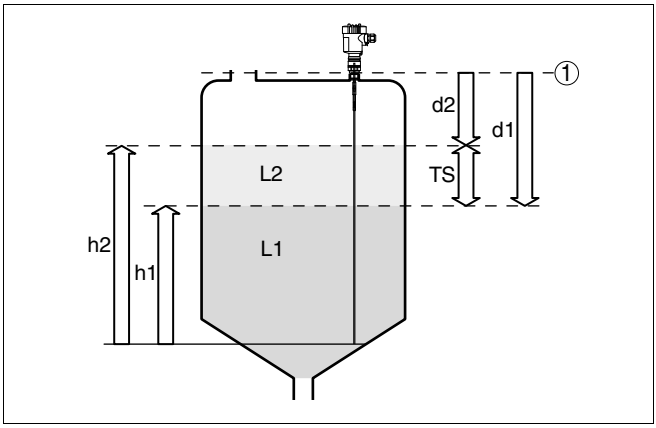

Fig. 2: Interface measurement
1 Reference plane
d1 Distance to the interface
d2 Distance to the level
TS Thickness of the upper medium (d1 - d2)
h1 Height - Interface
h2 Height - Level
L1 Lower medium
L2 Upper medium

Output signal

The interface is directly processed by the sensor and outputted as digital output signal.

The display of PLICSCOM and PACTware outputs the distance to the interface (d1) in m(d).

Power supply and bus communication

Power supply via the Profibus DP/PA segment coupler or VEGALOG 571 EP cards. A two-wire cable according to Profibus specification serves as carrier of both power and digital data signals for multiple sensors. The instrument profile of VEGAFLEX 67 corresponds to profile specification version 3.0.

GSD/EDD

The GSD (instrument master files) and bitmap files necessary for planning your Profibus-DP-(PA) communication network are available from the download section on the VEGA homepage www.vega.com under "*Services - Downloads - Software - Profibus*". There you can also find the appropriate certificates. In a PDM environment, an EDD (Electronic Device Description) is also required to enable the full range of sensor functions (also available as a download).A CD with the

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appropriate files can be ordered via e-mail under info@de.vega.com or by phone from one of the VEGA agencies under the order number "DRIVER.S".

The backlight of the indicating and adjustment module is powered by the sensor. Prerequisite is a certain level of supply voltage.

Data for power supply are specified in chapter "*Technical data*".

The optional heating requires its own power supply. You can find further details in the supplementary instructions manual "*Heating for indicating and adjustment module*".

This function is generally not available for approved instruments.

3.3 Operation

VEGAFLEX 67 can be adjusted with different adjustment media:

- with indicating and adjustment module
- with the suitable VEGA DTM in conjunction with an adjustment software according to the FDT/DTM standard, e.g. PACTware and PC
- with the adjustment program PDM

The entered parameters are generally saved in VEGAFLEX 67, optionally also in the indicating and adjustment module or in PACTware.

3.4 Packaging, transport and storage

Packaging

Your instrument was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test according to DIN EN 24180.

The packaging of standard instruments consists of environment-friendly, recyclable cardboard. For special versions, PE foam or PE foil is also used. Dispose of the packaging material via specialised recycling companies.

Transport

Transport must be carried out under consideration of the notes on the transport packaging. Nonobservance of these instructions can cause damage to the device.

Transport inspection

The delivery must be checked for completeness and possible transit damage immediately at receipt. Ascertained transit damage or concealed defects must be appropriately dealt with.

Storage

Up to the time of installation, the packages must be left closed and stored according to the orientation and storage markings on the outside.

Unless otherwise indicated, the packages must be stored only under the following conditions:

- Not in the open
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration

Storage and transport temperature

- Storage and transport temperature see "*Supplement - Technical data - Ambient conditions*"
- Relative humidity 20 … 85 %

4 Mounting

4.1 General instructions

Mounting position

Select an installation position you can easily reach for mounting and connecting as well as later retrofitting of an indicating and adjustment module. The housing can be rotated by 330° without the use of any tools. You can also install the indicating and adjustment module in four different positions (each displaced by 90°).

Welding work

Before beginning the welding work, remove the oscillator (electronics) from the sensor. By doing this, you avoid damage to the electronics through inductive coupling.

Handling

With threaded versions, the housing must not be used to screw in the instrument! Applying tightening forces on the housing can damage its internal parts.

Use the hexagon for screwing in.

Moisture

Use the recommended cables (see chapter "*Connecting to power supply*") and tighten the cable gland.

You can give your instrument additional protection against moisture penetration by leading the connection cable downward in front of the cable entry. Rain and condensation water can thus drain off. This applies mainly to outdoor mounting as well as installation in areas where high humidity is expected (e. g. through cleaning processes) or on cooled or heated vessels.

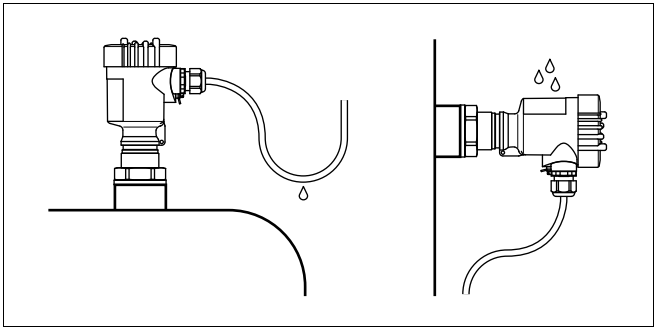


Fig. 3: Measures against moisture penetration

Measuring range

The reference plane for the measuring range of the sensors is the sealing surface of the thread or flange.

Keep in mind that a min. distance must be maintained below the reference plane and possibly also at the end of the probe - measurement in these areas is not possible (dead band). Keep in mind that the cable length cannot be used all the way to the end because measurement in the area of the gravity weight is not possible. These min. distances (dead bands) are listed in chapter "*Technical data*".

Pressure

The process fitting must be sealed if there is gauge or low pressure in the vessel. Before use, check if the seal material is resistant against the measured product and the process temperature.

The max. permissible pressure is specified in chapter "*Technical data*" or on the type label of the sensor.

4.2 Mounting instructions

Mounting position

When mounting the cable and rod versions of VEGAFLEX 67 keep at least a distance of 300 mm (11.81 in) to other vessel installations or to the vessel wall.

During operation, the probe must not touch any installations or the vessel wall. If necessary, fasten the probe end.

In vessels with conical bottom it can be advantageous to mount the sensor in the center of the vessel, as measurement is then possible down to the lowest point of the bottom. When using the cable version, keep in mind that measurement down to the tip of the probe is not possible. The exact value of the

min. distance (lower dead band) is stated in chapter "*Technical data*".

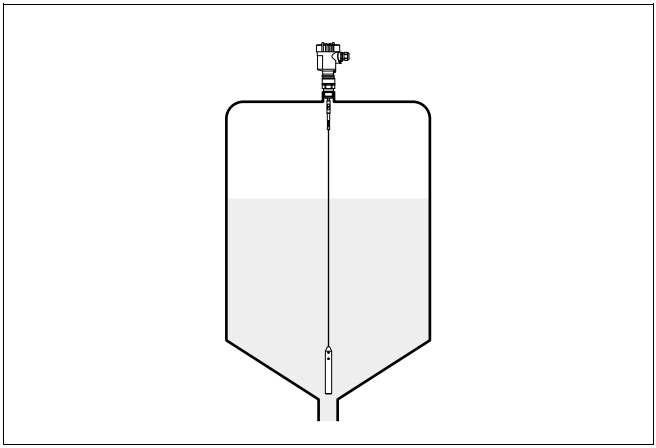


Fig. 4: Vessel with conical bottom

Torque with PTFE plated flanges

To compensate the normal voltage loss due to sealing materials, you have to additionally use disc springs for fastening flange screws on PTFE coated flanges. Tighten the screws moderately with the torque stated in the technical data.

Inflowing medium

Make sure that the probe is not subjected to strong lateral forces. Mount VEGAFLEX 67 at a position in the vessel where no disturbances, e.g. from filling openings, agitators, etc., can occur.

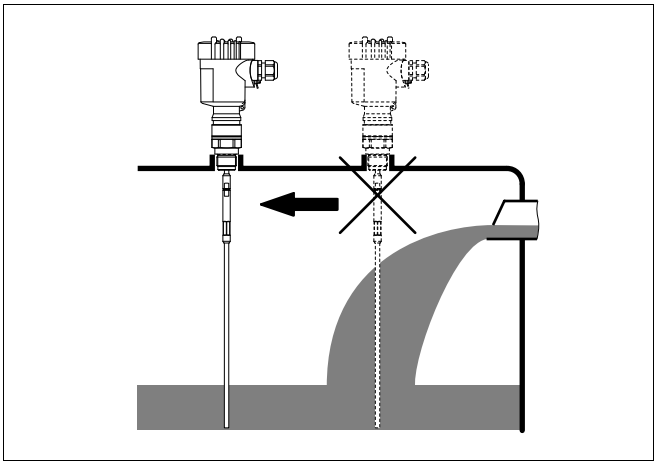


Fig. 5: Lateral load

Excessive system vibration or shocks, e.g. caused by agitators or turbulence in the vessel (e.g. from fluidisation) can cause the coax probe of VEGAFLEX 67 to vibrate in resonance. Should a coax probe of more than 1 m (3.281 in) length should be used, you can provide a suitable support or guy directly above the end of the probe to stabilise it.

Fixing

If there is a danger of the probe touching the vessel wall during operation due to product movements or agitators etc., the measuring probe should be securely fixed.

In the gravity weight there is a thread (M12), e.g. for a ring bolt (article no. 2.27424).

Make sure that the probe cable is not completely taut. Avoid tensile loads on the cable.

Avoid undefined cable-vessel connections, i.e. the connection must be either grounded reliably or isolated reliably. Any deviation from this requirement can lead to measurement errors.

5 Connecting to power supply

5.1 Preparing the connection

Note safety instructions

Always keep in mind the following safety instructions:

- Connect only in the complete absence of line voltage
- If overvoltage surges are expected, overvoltage arresters should be installed according to Profibus specifications

Tip:
We recommend VEGA overvoltage arrester B63-32.

Take note of safety instructions for Ex applications

In hazardous areas you should take note of the appropriate regulations, conformity and type approval certificates of the sensors and power supply units.

Select power supply

Power is supplied via a Profibus DP/PA segment coupler or a VEGALOG 571 EP input card. The power supply range can differ depending on the instrument version.

Data for power supply are specified in chapter "*Technical data*".

Selecting connection cable

Connection is made with screened cable according to the Profibus specification. Power supply and digital bus signal are carried over the same two-wire connection cable.

Use cable with round cross-section. A cable outer diameter of 5 … 9 mm (0.2 … 0.35 in) ensures the seal effect of the cable gland. If you are using cable with other diameter or cross-section, you have to exchange the seal or use a suitable cable gland.

Please make sure that your installation is carried out according to the Profibus specification. In particular, make sure that the termination of the bus is done with appropriate terminating resistors.

Cable gland ½ NPT

On the instrument with cable entry ½ NPT and plastic housing there is a metallic ½" threaded insert moulded into the plastic housing.

Caution:
No grease should be used when screwing the NPT cable gland or steel tube into the threaded insert. Standard grease can contain additives that corrode the connection between threaded insert and housing. This would influence the stability of the connection and the tightness of the housing.

Cable screening and grounding

In systems with potential equalisation, connect the cable screen directly to ground potential at the power supply unit, in the connection box and at the sensor. The screen in the sensor must be connected directly to the internal ground terminal. The ground terminal outside on the housing must be connected to the potential equalisation (low impedance).

In systems without potential equalisation, connect the cable screen directly to ground potential at the power supply unit and at the sensor. In the connection box or T-distributor, the screen of the short stub to the sensor must not be connected to ground potential or to another cable screen. The cable screens to the power supply unit and to the next distributor must be connected to each other and also connected to ground potential via a ceramic capacitor (e.g. 1 nF, 1500 V). The low frequency potential equalisation currents are thus suppressed, but the protective effect against high frequency interference signals remains.

The total capacitance of the cable and of all capacitors must not exceed 10 nF in Ex applications.

Select connection cable for Ex applications

Take note of the corresponding installation regulations for Ex applications. In particular, make sure that no potential equalisation currents flow over the cable screen. In case of grounding on both sides this can be achieved by the use of a capacitor or a separate potential equalisation.

5.2 Connection steps - Instrument housing

Proceed as follows:

1 Unscrew the housing cover

2 If an indicating and adjustment module is installed, remove it by turning it slightly to the left.

3 Loosen compression nut of the cable entry

4 Remove approx. 10 cm (4 in) of the cable mantle, strip approx. 1 cm (0.4 in) insulation from the ends of the individual wires

5 Insert the cable through the cable gland into the sensor

6 Lift the opening levers of the terminals with a screwdriver (see following illustration)

7 Insert the wire ends into the open terminals according to the wiring plan

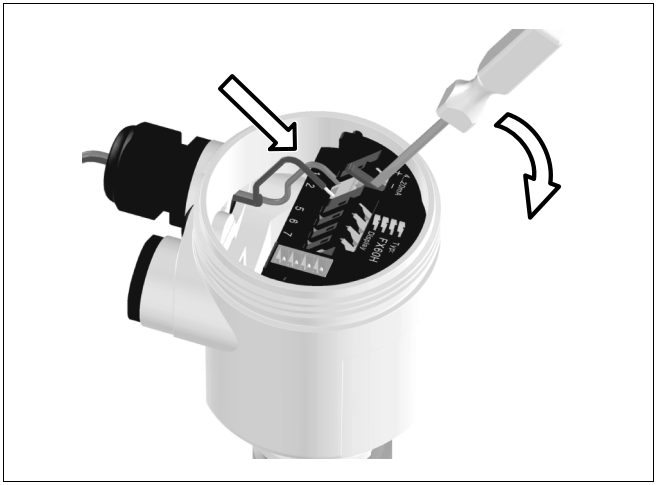


Fig. 6: Connection steps 6 and 7

8 Press down the opening levers of the terminals, you will hear the terminal spring closing

9 Check the hold of the wires in the terminals by lightly pulling on them

10 Connect the screen to the internal ground terminal, connect the outer ground terminal with potential equalisation

11 Tighten the compression nut of the cable entry. The seal ring must completely encircle the cable

12 Screw the housing cover on

The electrical connection is finished.

5.3 Wiring plan, single chamber housing

The following illustrations apply to the non-Ex as well as to the Ex-ia version.

Housing overview

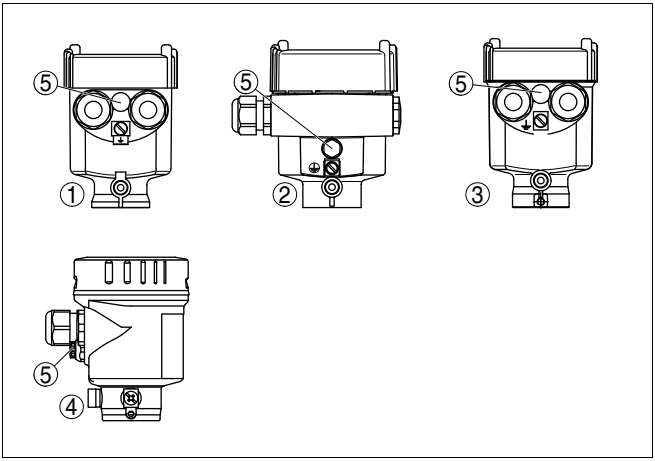


Fig. 7: Material versions, single chamber housing
1 Plastic
2 Aluminium
3 Stainless steel, investment casting
4 Stainless steel, electro-polished
5 Filter element for air pressure compensation of all material versions. Blind stopper with version IP 66/IP 68, 1 bar for Aluminium and stainless steel

Electronics and connection compartment

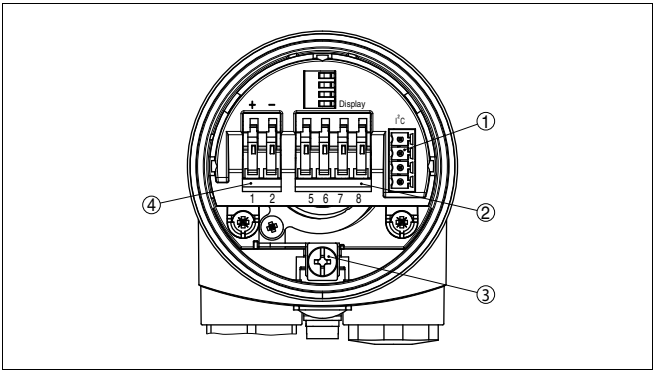


Fig. 8: Electronics and connection compartment, single chamber housing
1 Plug connector for VEGACONNECT (I^2C interface)
2 Spring-loaded terminals for connection of the external indication VEGADIS 61
3 Ground terminal for connection of the cable screen
4 Spring-loaded terminals for voltage supply

Wiring plan

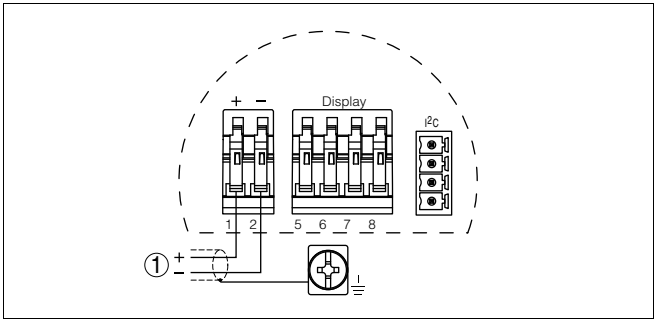


Fig. 9: Wiring plan, single chamber housing
1 Voltage supply/Signal output

5.4 Wiring plan, double chamber housing

The following illustrations apply to the non-Ex as well as to the Ex-ia version.

Housing overview

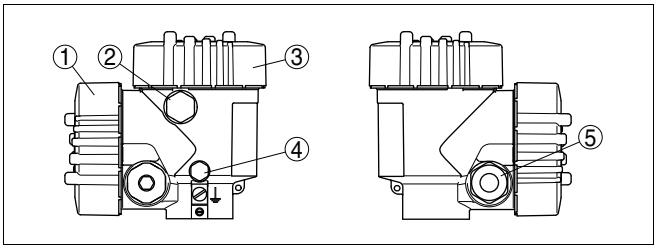


Fig. 10: Double chamber housing
1 Housing cover, connection compartment
2 Blind stopper or plug M12 x 1 for VEGADIS 61 (optional)
3 Housing cover, electronics compartment
4 Filter element for air pressure compensation
5 Cable gland

Electronics compartment

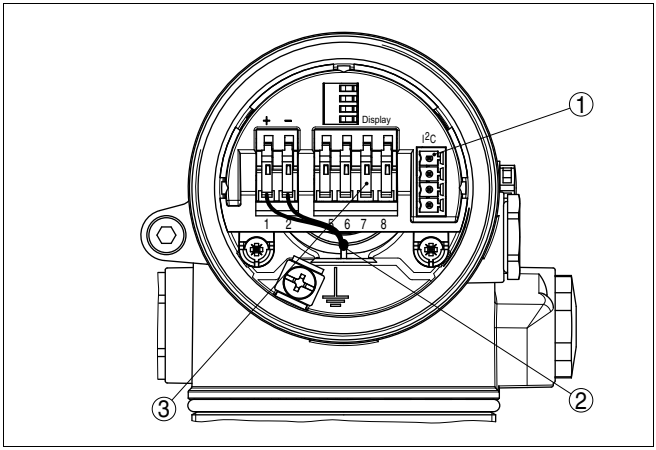


Fig. 11: Electronics compartment, double chamber housing
1 Plug connector for VEGACONNECT (I^2C interface)
2 Internal connection cable to the connection compartment
3 Terminals for VEGADIS 61

Connection compartment

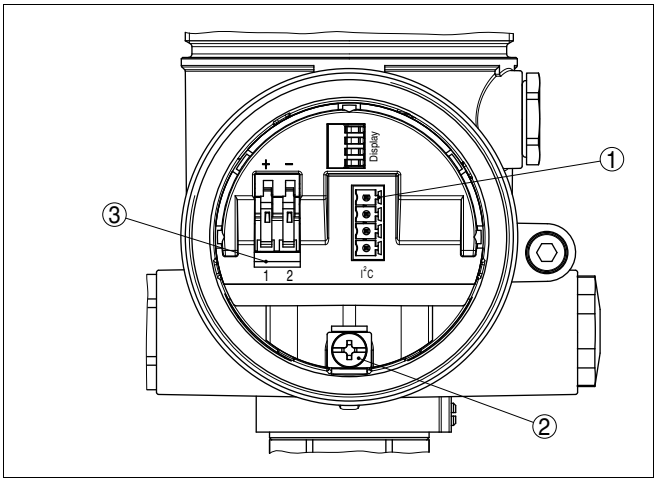


Fig. 12: Connection compartment, double chamber housing
1 Plug connector for VEGACONNECT (I^2C interface)
2 Ground terminal for connection of the cable screen
3 Spring-loaded terminals for voltage supply

Wiring plan

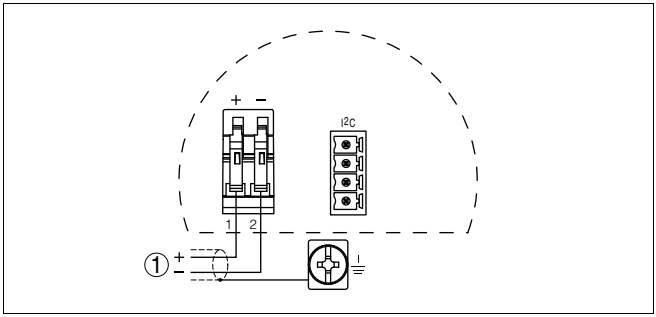


Fig. 13: Wiring plan, double chamber housing
1 Voltage supply/Signal output

5.5 Wiring plan - version IP 66/IP 68, 1 bar

Wire assignment, connection cable

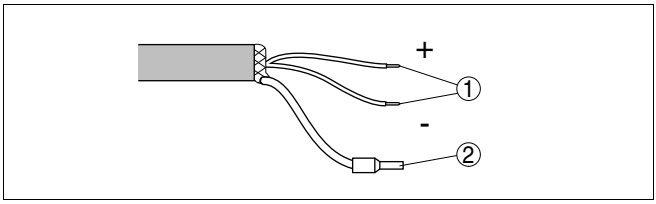


Fig. 14: Wire assignment, connection cable
1 brown (+) and blue (-) to power supply or to the processing system
2 Shielding

6 Set up with the indicating and adjustment module PLICSCOM

6.1 Short description

Function/Configuration

The indicating and adjustment module is used for measured value display, adjustment and diagnosis. It can be mounted in the following housing versions and instruments:

- All sensors of the plics® instrument family, in the single as well as in the double chamber housing (optionally in the electronics or connection compartment)
- External indicating and adjustment unit VEGADIS 61

From a hardware version …- 01 or higher of PLICSCOM as well as a hardware version …- 01, 03 or higher of the corresponding sensor, an integrated backlight can be switched on via the adjustment menu. The hardware version is stated on the type label of the PLICSCOM or the sensor electronics.

Note:
You can find detailed information on the adjustment in the operating instructions manual "*Indicating and adjustment module*".

6.2 Insert indicating and adjustment module

Mount/Dismount indicating and adjustment module

The indicating and adjustment module can be inserted into the sensor and removed again at any time. It is not necessary to interrupt the power supply.

Proceed as follows:

1 Unscrew the housing cover

2 Place the indicating and adjustment module in the desired position on the electronics (you can choose any one of four different positions - each displaced by 90°)

3 Press the indicating and adjustment module onto the electronics and turn it to the right until it snaps in.

4 Screw housing cover with inspection window tightly back on

Removal is carried out in reverse order.

The indicating and adjustment module is powered by the sensor, an additional connection is not necessary.

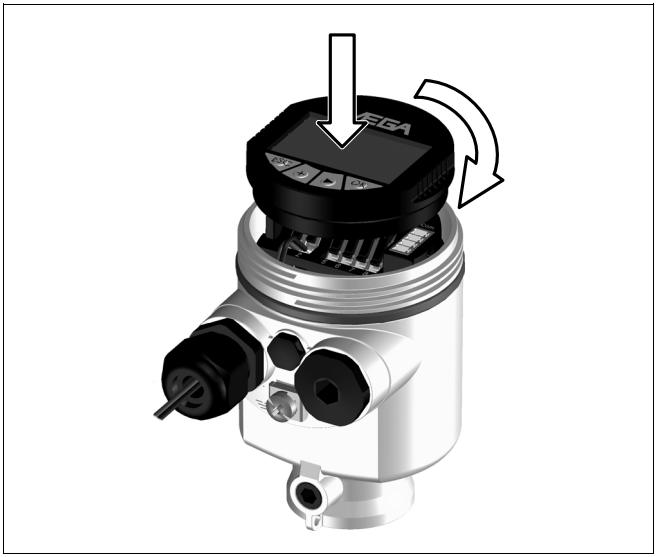


Fig. 15: Installation of the indicating and adjustment module

Note:
If you intend to retrofit the instrument with an indicating and adjustment module for continuous measured value indication, a higher cover with an inspection glass is required.

6.3 Adjustment system

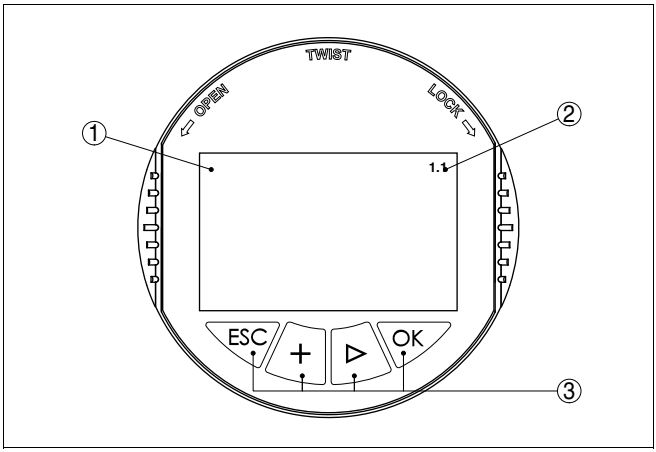


Fig. 16: Indicating and adjustment elements
1 LC display
2 Indication of the menu item number
3 Adjustment keys

Key functions

- ***[OK]*** key:
  - Move to the menu overview
  - Confirm selected menu
  - Edit parameter
  - Save value
- ***[->]*** key to select:
  - menu change
  - list entry
  - Select editing position
- ***[+]*** key:
  - Change value of the parameter
- ***[ESC]*** key:
  - interrupt input
  - jump to the next higher menu

Adjustment system

The sensor is adjusted via the four keys of the indicating and adjustment module. The LC display indicates the individual menu items. The functions of the individual keys are shown in the above illustration. Approx. 10 minutes after the last pressing of a key, an automatic reset to measured value indication is triggered. Any values not confirmed with ***[OK]*** will not be saved.

6.4 Setup procedure

Switch on phase

After VEGAFLEX 67 is connected to voltage supply or after voltage recurrence, the instrument carries out a self-check for approx. 30 seconds. The following steps are carried out:

- Internal check of the electronics
- Indication of the instrument type, the firmware as well as the sensor TAGs (sensor designation)
- Status byte goes briefly to fault value

Then the current measured value will be displayed and the corresponding digital output signal will be outputted to the cable.[1)]

Address setting

Before starting the actual parameter adjustment of a Profibus PA sensor, the address setting must first be carried out. You will find a detailed description in the operating instructions manual of the indicating and adjustment module or in the online help of PACTware or DTM.

Parameter adjustment

As VEGAFLEX 67 is a distance measuring instrument, the distance from the sensor to the product surface is measured. To have the real product level displayed, an allocation of the measured distance to the percentage height must be made. To carry out this adjustment, the distance is entered with full and empty vessel. If these values are not known, an adjustment with the distance values, e.g. 10 % and 90 % is also possible. Starting point for these distance specifications is always the seal surface of the thread or flange. With these settings, the real level is calculated. Furthermore the operating range of the sensor is limited from maximum to the required range.

The real product level during this adjustment is not important, because the min./max. adjustment is always carried out without changing the product level. These settings can be made ahead of time without the instrument having to be installed.

In the main menu item "*Basic adjustment*", the individual submenu items should be selected one after the other and provided with the correct parameter values.

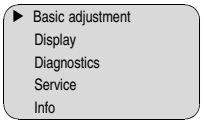
Start your parameter adjustment with the following menu items of the basic adjustment:

Carrying out min. adjustment

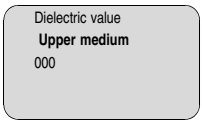
Proceed as follows:

1) The values correspond to the actual measured level as well as to the settings already carried out, e.g. default setting.

1 Move from the measured value display to the main menu by pushing ***[OK]***.

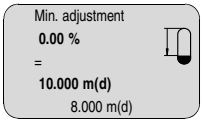


2 Select the menu item "*Basic adjustment*" with ***[->]*** and confirm with ***[OK]***. Now the menu item "**Dielectric value**" is displayed.



3 Enter the DK value of the upper medium and confirm with ***[OK]***.

Save the settings with ***[OK]*** and move to "Min. adjustment" with ***[->]***.



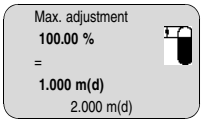
4 Prepare the % value for editing with ***[OK]*** and set the cursor to the requested position with ***[->]***. Set the requested percentage value with ***[+]*** and save with ***[OK]***. The cursor jumps now to the distance value.

5 Enter the suitable distance value in m for the empty vessel (e.g. distance from the sensor to the vessel bottom) corresponding to the percentage value.

6 Save the settings with ***[OK]*** and move to "Max. adjustment" with ***[->]***.

Carrying out max. adjustment

Proceed as follows:



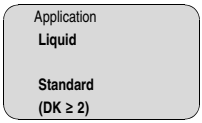
1 Prepare the % value for editing with ***[OK]*** and set the cursor to the requested position with ***[->]***. Set the requested percentage value with ***[+]*** and save with ***[OK]***. The cursor jumps now to the distance value.

2 Enter the appropriate distance value in m (corresponding to the percentage value) for the full vessel. Keep in mind that the max. level must lie below the dead band.

3 Save the settings with ***[OK]***.

Application

Each product has different reflective properties. In addition, there are various interfering factors which have to be taken into account: agitated product surfaces and foam generation (with liquids); dust generation, material cones and echoes from the vessel wall (with solids). To adapt the sensor to these different conditions, you should first select in this menu item under "*Medium*" the selection "*Liquid*" or "*Solid*".



Depending on the dielectric figure (dielectri value or ε_r), measured products can have a different reflective property. Therefore an additional selection possibility is available.

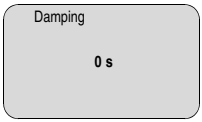
Under "*Sensitivity*" you can select "*Standard (DK ≥ 2)*" or "*Increased sensitivity (DK < 2)*".

Through this, the sensor is adapted perfectly to the product and measurement reliability, particularly in products with bad reflective properties, is considerably increased.

Enter the requested parameter via the appropriate keys, save your settings and jump to the next menu item with the ***[->]*** key.

Damping

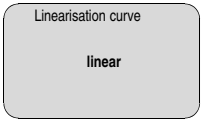
To suppress fluctuations in the measured value display, e. g. caused by an agitated product surface, an integration time can be set. This time can be between 0 and 999 seconds. Keep in mind that the reaction time of the entire measurement will then be longer and the sensor will react to measured value changes with a delay. In general, a period of a few seconds is sufficient to smooth the measured value display.



Enter the requested parameter via the appropriate keys, save your settings and jump to the next menu item with the ***[->]*** key.

Linearisation curve

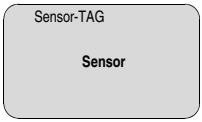
A linearization is necessary for all vessels in which the vessel volume does not increase linearly with the level - e. g. with a cylindrical or spherical tank - and the indication or output of the volume is required. Corresponding linearization curves are preprogrammed for these vessels. They represent the correlation between the level percentage and vessel volume. By activating the appropriate curve, the volume percentage of the vessel is displayed correctly. If the volume should not be displayed in percent but e.g. in l or kg, a scaling can be also set in the menu item "*Display*".



Enter the requested parameter via the appropriate keys, save your settings and jump to the next menu item with the ***[->]*** key.

Sensor-TAG

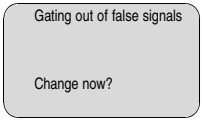
In this menu item you can enter an unambiguous designation for the sensor, e.g. the measurement loop name or the tank or product designation. In digital systems and in the documentation of larger plants, a singular designation should be entered for exact identification of individual measuring sites.



With this menu item, the Basic adjustment is finished and you can now jump to the main menu with the ***[ESC]*** key.

Gating out of false signals

High sockets or vessel installations, such as e. g. struts or agitators as well as buildup and weld joints on the vessel walls cause interfering reflections which can impair the measurement. A false echo storage detects and marks these false echoes, so that they are no longer taken into account for the level measurement. A false echo memory should be created with empty vessel so that all potential interfering reflections will be detected.



Proceed as follows:

1 Move from the measured value display to the main menu by pushing ***[OK]***.

2 Select the menu item "*Service*" with ***[->]*** and confirm with ***[OK]***. Now the menu item "*False signal suppression*" is displayed.

3 Confirm "*False signal suppression - Change now*" with ***[OK]*** and select in the below menu "*Create new*". Enter the actual distance from the sensor to the product surface. All false signals in this area are detected by the sensor and saved after confirming with ***[OK]***.

Note:
Check the distance to the product surface, because if an incorrect (too large) value is entered, the existing level will be saved as false signal. The filling level would then no longer be detectable in this area.

Copy sensor data

This function enables reading out parameter adjustment data as well as writing parameter adjustment data into the sensor via the indicating and adjustment module. A description of the function is available in the operating instructions manual "*Indicating and adjustment module*".

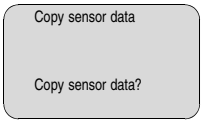
The following data are read out or written with this function:

- Measured value presentation
- Adjustment
- Medium
- Vessel form
- Damping
- Linearisation curve
- Sensor-TAG
- Displayed value
- Unit of measurement
- Language
- Sensitivity
- PA scaling unit
- PV-Out-Scale
- Channel
- Additional PA value
- Dielectric value

The following safety-relevant data are **not** read out or written:

- HART mode
- PIN
- SIL
- Sensor length/Sensor type

- Gating out of false signals



Reset

Basic adjustment

If the "*Reset*" is carried out, the sensor resets the values of the following menu items to the reset values (see chart):[2)]

The following values will be reset:

Function	Reset value
Max. adjustment	Distance, upper dead zone
Min. adjustment	Distance, supplied sensor length
Min. adjustment - Cable version	Distance, lower dead zone
Integration time ti	0 s
Linearisation	linear
Sensor-TAG	Sensor
Display	PA-Out 1
Channel (PV)	lin %
Additional PA value (PV)	lin %
Out-Scale-Unit	%
PV-Out-Scale	0.00 lin % = 0.0 % 100.0 lin % = 100 %

The values of the following menu items are *not* reset to the reset values (see chart) with "**Reset**":

Function	Reset value
Sensor address	no reset
Language	no reset

Factory setting

Like basic adjustment, furthermore special parameters are reset to default values.[3)]

Pointer

The min. and max. distance values are reset to the actual value.

[2)] Sensor-specific basic adjustment.

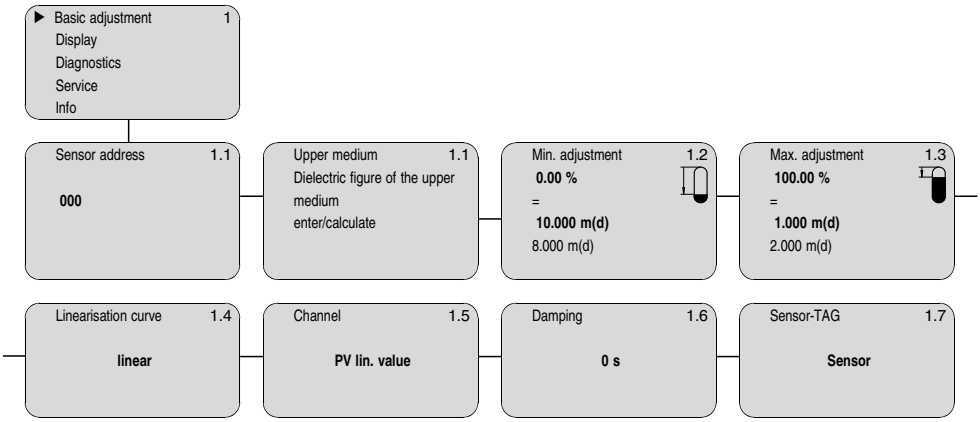
[3)] Special parameters are parameters which are set customer-specifically on the service level with the adjustment software PACTware.

Optional settings

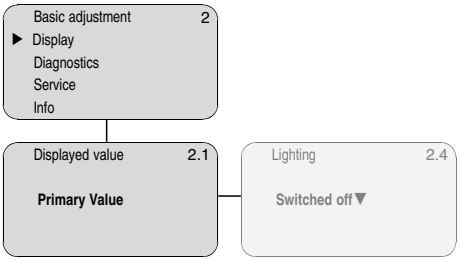
Additional adjustment and diagnosis options such as e.g. scaling, simulation or trend curve presentation are shown in the following menu schematic. You will find a detailed description of these menu items in the operating instructions manual "*Indicating and adjustment module*".

6.5 Menu schematic

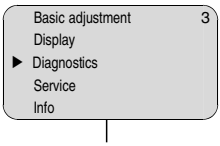
Basic adjustment

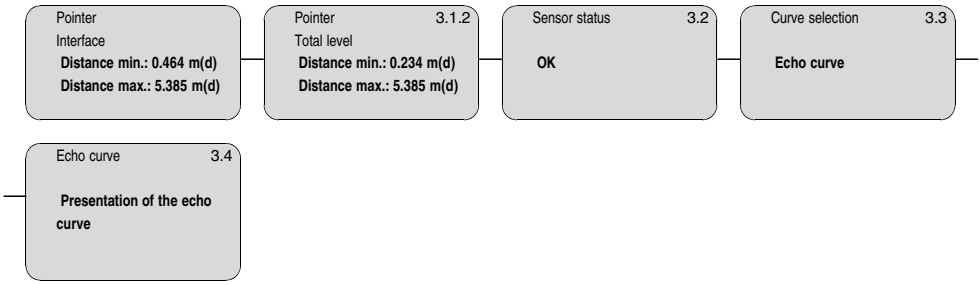


Display

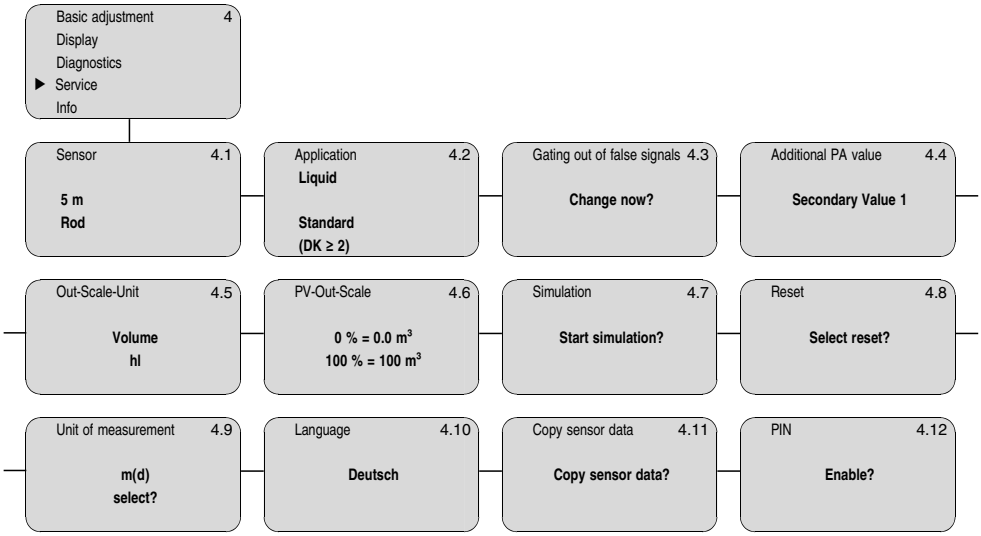


Diagnostics

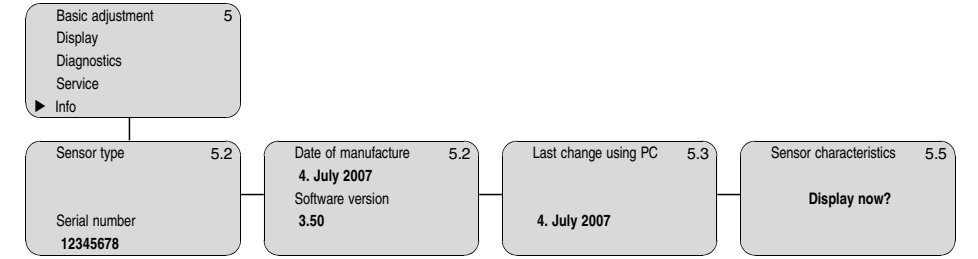




Service



Info



7 Setup with PACTware and other adjustment programs

7.1 Connecting the PC

Connection via I²C interface

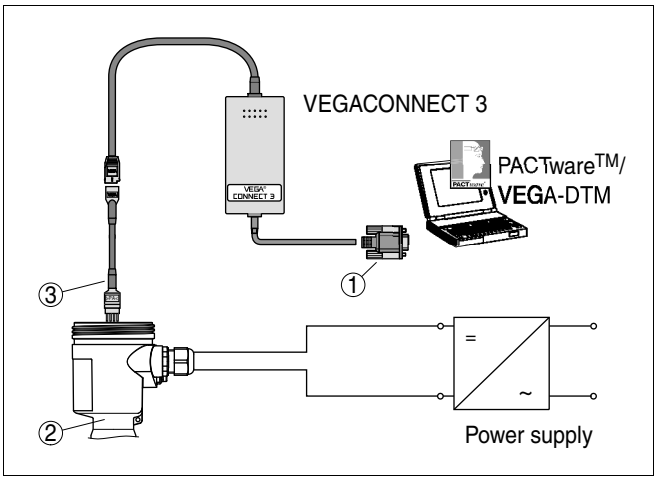


Fig. 17: Connection of the PC directly to the sensor via I²C interface
1 RS232 connection
2 VEGAFLEX 67
3 I²C adapter cable for VEGACONNECT 3

Necessary components:

- VEGAFLEX 67
- PC with PACTware and suitable VEGA DTM
- VEGACONNECT 3 with I²C adapter cable (article no. 2.27323)
- Power supply unit

7.2 Parameter adjustment with PACTware

Further setup steps are described in the operating instructions manual "*DTM Collection/PACTware*" attached to each CD and which can also be downloaded from our homepage. A detailed description is available in the online help of PACTware and the VEGA DTMs.

Note:
Keep in mind that for setup of VEGAFLEX 67, DTM-Collection in the actual version must be used.

All currently available VEGA DTMs are provided in the DTM Collection on CD and can be obtained from the responsible VEGA agency for a token fee. This CD includes also the up-to-date PACTware version. The basic version of this DTM Collection incl. PACTware is also available as a free-of-charge download from the Internet.

Go via www.vega.com and "*Downloads*" to the item "*Software*".

7.3 Parameter adjustment with PDM

For VEGA sensors, instrument descriptions for the adjustment program PDM are available as EDD. The instrument descriptions are already implemented in the current version of PDM. For older versions of PDM, a free-of-charge download is available via Internet.

Go via www.vega.com and "*Downloads*" to the item "*Software*".

7.4 Saving the parameter adjustment data

It is recommended to document or save the parameter adjustment data. They are hence available for multiple use or service purposes.

The VEGA DTM Collection and PACTware in the licensed, professional version provide suitable tools for systematic project documentation and storage.

8 Maintenance and fault rectification

8.1 Maintenance

When used in the correct way, no special maintenance is required in normal operation.

8.2 Remove interferences

Reaction when malfunctions occur

The operator of the system is responsible for taken suitable measures to remove interferences.

Causes of malfunction

A maximum of reliability is ensured. Nevertheless, faults can occur during operation. These may be caused by the following, e.g.:

- Sensor
- Process
- Voltage supply
- Signal processing

Fault rectification

The first measures to be taken are to check the output signals as well as to evaluate the error messages via the indicating and adjustment module. The procedure is described below. Further comprehensive diagnostics can be carried out on a PC with the software PACTware and the suitable DTM. In many cases, the causes can be determined in this way and faults can be rectified.

24 hour service hotline

However, should these measures not be successful, call the VEGA service hotline in urgent cases under the phone no. **+49 1805 858550**.

The hotline is available to you 7 days a week round-the-clock. Since we offer this service world-wide, the support is only available in the English language. The service is free of charge, only the standard telephone costs will be charged.

Checking Profibus PA

? When an additional instrument is connected, the segment fails.

- Max. supply current of the segment coupler exceeded

→ Measure the current consumption, reduce size of segment

? Wrong presentation of the measured value in Simatic S5

- Simatic S5 cannot interpret the number format IEEE of the measured value

→ Insert converting component from Siemens

? In Simatic S7 the measured value is always presented as 0

- Only four bytes are consistently loaded in the PLC

→ Use function component SFC 14 to load 5 bytes consistently

? Measured value on the indicating and adjustment module does not correspond to the value in the PLC

- The menu item "*Display - Display value*" is not set to "*PA-Out*"

→ Check values and correct, if necessary

? No connection between PLC and PA network

- Incorrect adjustment of the bus parameter and the segment coupler-dependent baud rate

→ Check data and correct, if necessary

? Instrument does not appear during connection setup

- Profibus DP cable pole-reversed

→ Check cable and correct, if necessary

- Incorrect termination

→ Check termination at the beginning and end points of the bus and terminate, if necessary, according to the specification

- Instrument not connected to the segment, double assignment of an address

→ Check and correct, if necessary

In Ex applications, the regulations for the wiring of intrinsically safe circuits must be observed.

Fault messages via the indicating/adjustment module

? E013

- no measured value available

→ sensor in boot phase

→ Sensor does not find an echo, e.g. due to faulty installation or wrong parameter adjustment

→ Wrong sensor length entered

? E017

- Adjustment span too small

→ Carry out a fresh adjustment and increase the distance between min. and max. adjustment

? E036

- no operable sensor software

→ Carry out a software update or send the instrument for repair

? E042/E043

- Hardware error, electronics defective

→ Exchange instrument or return instrument for repair

? E113

- Communication conflict

→ Exchange instrument or return instrument for repair

Reaction after fault rectification

Depending on the failure reason and measures taken, the steps described in chapter "*Set up*" must be carried out again, if necessary.

8.3 Exchanging the electronics module

Preparations

If the electronics module is defective, it can be replaced by the user.

In Ex applications only one oscillator with respective Ex approval may be used.

If there is no electronics module available on site, one can be ordered from the agency serving you.

The new oscillator must contain the order data of the sensor. These can be loaded as follows:

- At the factory by VEGA
- Or on site by the user

Information:
When loading on site, first of all the order data must be downloaded from the Internet (see operating instructions manual "*Oscillator*").

In both cases, the serial number of VEGAFLEX 67 is required. The serial numbers are stated on the type label of VEGAFLEX 67, on the inner wall of the housing or on the delivery note.

Assignment

The oscillators are adapted to the respective sensor and differ in their signal output or in their power supply. You can find a suitable oscillator in the following overview.

Profibus PA

Electronics module FX-E.67P suitable for VEGAFLEX 67 - Profibus PA:

- FX-E.67P**X** (X = without approvals)
- FX-E.67P**C** (C = approvals XM, CX, CM according to product list)

8.4 Instrument repair

If a repair is necessary, please proceed as follows:

You can download a return form (23 KB) from our Internet homepage www.vega.com under: "*Downloads - Forms and certificates - Repair form*".

By doing this you help us carry out the repair quickly and without having to call back for needed information.

- Print and fill out one form per instrument
- Clean the instrument and pack it damage-proof
- Attach the completed form and probably the safety data sheet outside on the packaging
- Please ask the agency serving you for the address of your return shipment. You can find the respective agency on our website www.vega.com under: "*Company - VEGA worldwide*"

9 Dismounting

9.1 Dismounting steps

Warning:
Before dismounting, be aware of dangerous process conditions such as e.g. pressure in the vessel, high temperatures, corrosive or toxic products etc.

Take note of chapters "*Mounting*" and "*Connecting to power supply*" and carry out the listed steps in reverse order.

9.2 Disposal

The instrument consists of materials which can be recycled by specialised recycling companies. We use recyclable materials and have designed the electronics to be easily separable.

WEEE directive 2002/96/EG
This instrument is not subject to the WEEE directive 2002/96/EG and the respective national laws. Pass the instrument directly on to a specialised recycling company and do not use the municipal collecting points. These may be used only for privately used products according to the WEEE directive.

Correct disposal avoids negative effects to persons and environment and ensures recycling of useful raw materials.

Materials: see chapter "*Technical data*"

If you have no possibility to dispose of the old instrument professionally, please contact us concerning return and disposal.

10 Supplement

10.1 Technical data

General data

Material 316L corresponds to 1.4404 or 1.4435

Materials, wetted parts	
– Process fitting	PFA and TFM PTFE 1600
– Rod: ø 10 mm (0.394 in)	PFA and TFM PTFE 1600
– Cable: ø 4 mm (0.157 in) with gravity weight (optional)	PFA and TFM PTFE 1600
– Process seal	On site (instruments with thread: Klingersil C-4400 is attached)
Materials, non-wetted parts	
– inner conductor	316L
– Rod	316L
– Cable	316L
– Flange	316L
– Gravity weight	316L
– Plastic housing	plastic PBT (Polyester)
– Aluminium die-casting housing	Aluminium die-casting AlSi10Mg, powder-coated - basis: Polyester
– Stainless steel housing - precision casting	316L
– Stainless steel housing, electropolished	316L
– Seal between housing and housing cover	NBR (stainless steel housing, investment casting), silicone (Aluminium/plastic housing, stainless steel housing, electro-polished)
– Inspection window in housing cover (optional)	Polycarbonate
– Ground terminal	316L
Torque of the flange screws (min.)	60 Nm (44.25 lbf ft)
Surface quality (rod, cable)	R_a < 0.8 µm
Process fittings	
– Pipe thread, cylindrical (ISO 228 T1)	G¾ A, G1 A, G1½ A
– American pipe thread, tapered	¾ NPT, 1 NPT, 1½ NPT

– Flanges	DIN from DN 25, ANSI from 1"
– hygienic fittings	Bolting DN 40 PN 40, Bolting DN 50 PN 25, Tri-Clamp 2" PN 16, Tri-Clamp 3" PN 16

Weight

– Instrument weight (depending on process fitting)	approx. 0.8 … 8 kg (0.176 … 17.64 lbs)
– Rod: ø 10 mm (0.394 in)	approx. 620 g/m (6.7 oz/ft)
– Cable: ø 4 mm (0.157 in)	approx. 80 g/m (0.86 oz/ft)
– Gravity weight	325 g (11.5 oz)

Sensor length L (from seal surface), cannot be shortened

– Rod: ø 10 mm (0.394 in)	0.3 … 4 m (0.984 … 13.12 ft)
– Trimming accuracy - rod	< 1 mm (0.039 in)
– Cable: ø 4 mm (0.157 in)	1 … 32 m (3.281 … 105 ft)
– Trimming accuracy - cable	±0.05 %
Lateral load - rod: ø 10 mm (0.394 in)	4 Nm (3 lbf ft)
Max. tensile load with cable: ø 4 mm (0.157 in)	2 KN (450 lbf)

Input variable

Measured value	Level of liquids
Min. dielectric figure (lower medium)	by 10 higher than the ε_r of the upper medium
Min. layer thickness (upper medium)	> 100 mm (3.937 in)
Min. dielectric figure (upper medium) with rod, cable version	ε_r > 1.6

Dead band - rod version: ø 6 mm (0.236 in)

– top	80 mm (3.15 in)
– bottom	0 mm

Dead band - cable version: ø 4 mm (0.157 in)

– top	150 mm (5.91 in)
– bottom	250 mm (9.843 in) gravity weight + 100 mm

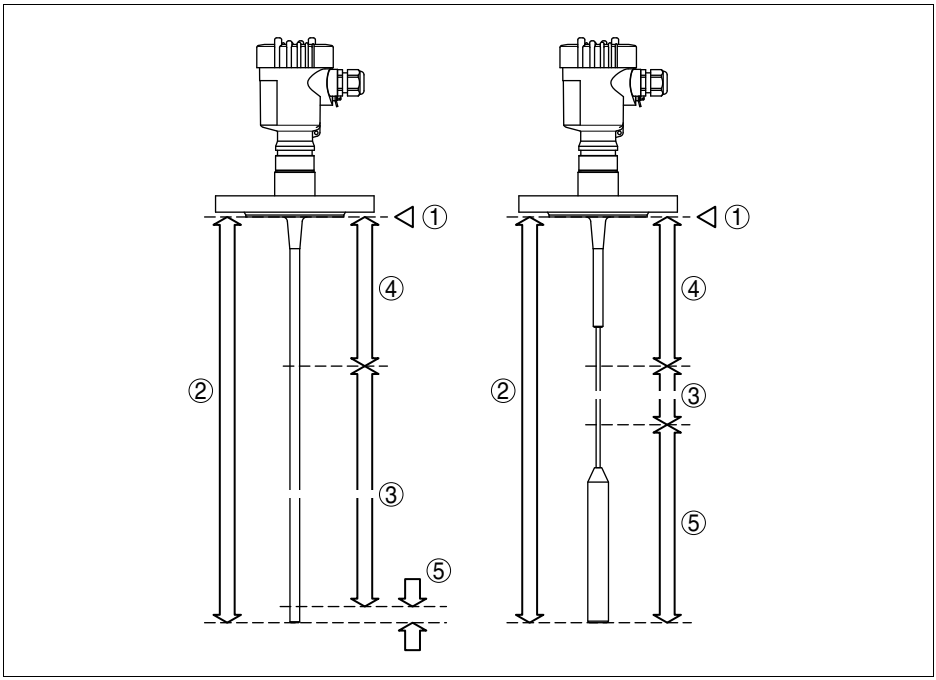


Fig. 18: Measuring ranges of the VEGAFLEX 67 - rod and cable version

1 *Reference plane*
2 *Probe length*
3 *Measuring range*
4 *Upper dead band*
5 *Lower dead band (only with cable version)*

Output variable

Output signal	digital output signal, format according to IEEE-754
Sensor address	126 (default setting)
Current value	10 mA, ±0.5 mA
Integration time (63 % of the input variable)	0 … 999 s, adjustable
Step response or adjustment time	≤ 250 ms (ti: 0 s, 10 … 90 %)

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Accuracy (similar to DIN EN 60770-1)

Reference conditions according to DIN EN 61298-1

– Temperature	+18 … +30 °C (+64 … +86 °F)
– Relative humidity	45 … 75 %
– Air pressure	860 … 1060 mbar/86 … 106 kPa (12.5 … 15.4 psig)

Deviation in characteristics and characteristics

Reference installation conditions

– Flange size	> DN 100
– min. distance to installations	> 500 mm (19.69 in)
– Vessel diameter	1 m (3.281 ft) centrical installaton
– Medium	Water
Temperature drift	0.06 %/10 K relating to the max. measuring range
Accuracy	see diagrams

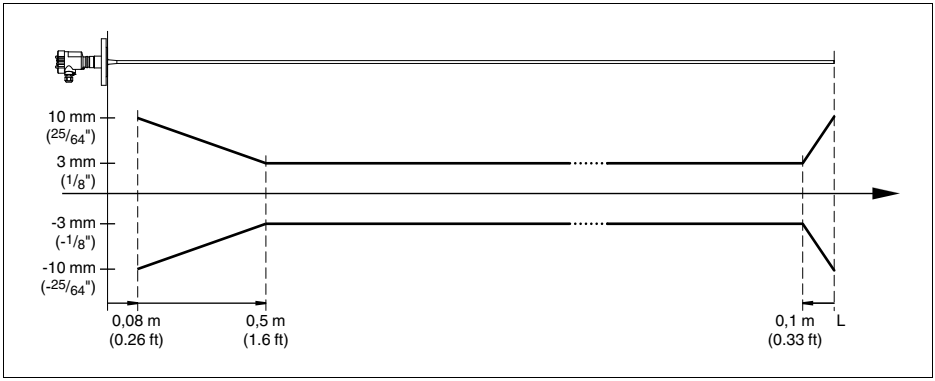

Fig. 19: Deviation VEGAFLEX 67 in rod version

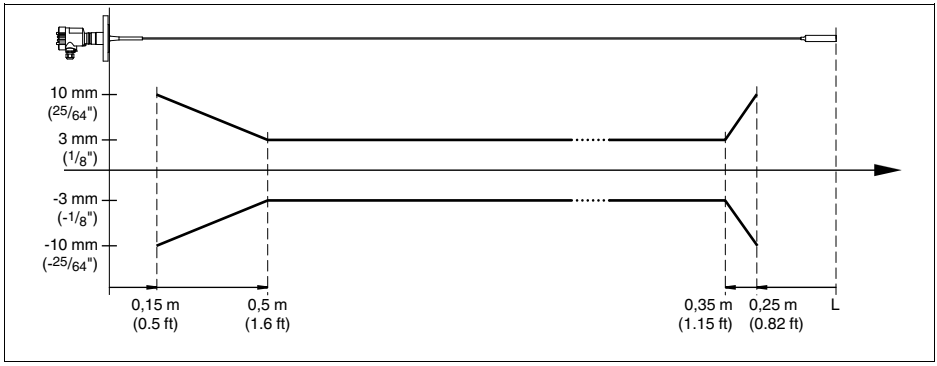

Fig. 20: Deviation VEGAFLEX 67 in cable version, length L < 15.000 mm

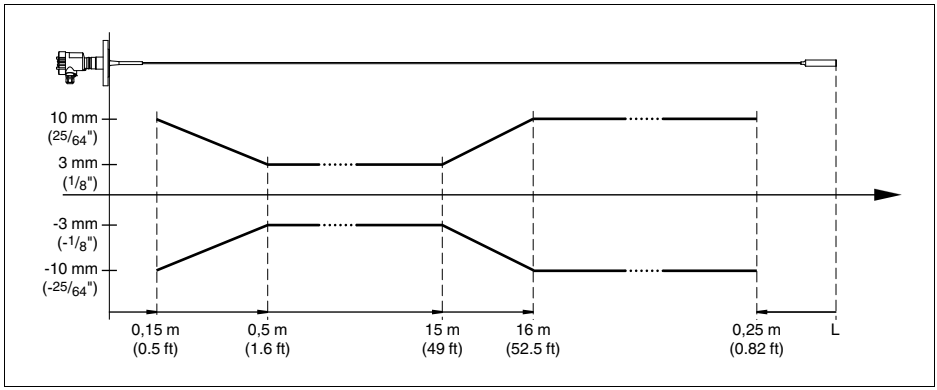

Fig. 21: Deviation VEGAFLEX 67 in cable version, length L > 15.000 mm

Ambient conditions

Ambient, storage and transport temperature	-40 … +80 °C (-40 … +176 °F)

Process conditions

Process pressure	
– Flange version ≤ 2"/DN 50	-0.5 … 16 bar/-50 … 1600 kPa (-7.3 … 232 psig), depending on the process fitting
– Flange version > 2"/DN 50	-0.2 … 16 bar/-20 … 1600 kPa (-2.9 … 232 psig), depending on the process fitting
Process temperature (flange temperature)	-40 … +150 °C (-40 … +302 °F)

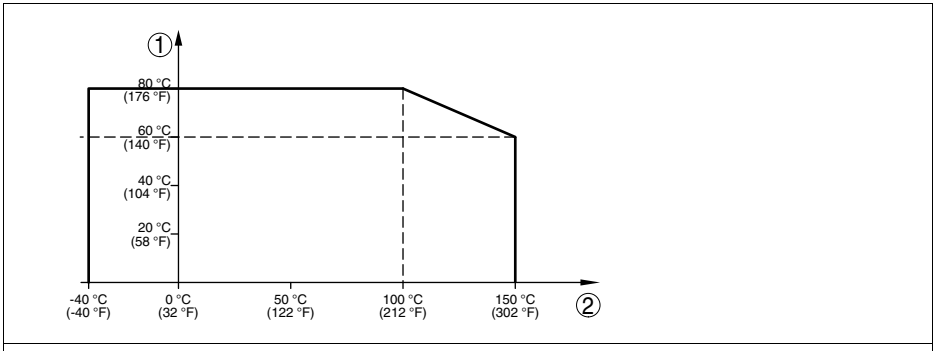

Fig. 22: Ambient temperature - Process temperature

1 Ambient temperature

2 Process temperature (depending on the seal material)

Electromechanical data - version IP 66/IP 67 and IP 66/IP 68; 0.2 bar

Cable entry/plug[4]	
– Single chamber housing	• 1 x cable gland M20 x 1.5 (cable: ø 5 … 9 mm), 1 x blind stopper M20 x 1.5 or: • 1 x closing cap M20 x 1.5; 1 x blind stopper M20 x 1.5 or: • 1 x closing cap ½ NPT, 1 x blind plug ½ NPT or: • 1 x plug (depending on the version), 1 x blind stopper M20 x 1.5
– Double chamber housing	• 1 x cable entry M20 x 1.5 (cable: ø 5 … 9 mm), 1 x blind stopper M20 x 1.5; 1 x blind stopper M16 x 1.5 or optionally available with 1 x plug M12 x 1 for VEGADIS 61 or: • 1 x closing cap ½ NPT, 1 x blind stopper ½ NPT, 1 x blind stopper M16 x 1.5 or optionally 1 x plug M12 x 1 for VEGADIS 61 or: • 1 x plug (depending on the version), 1 x blind stopper M20 x 1.5; 1 x blind stopper M16 x 1.5 or optionally available with 1 x plug M12 x 1 for VEGADIS 61
Spring-loaded terminals for wire cross-section	> 2.5 mm² (AWG 14)

Electromechanical data - version IP 66/IP 68, 1 bar

Cable entry	
– Single chamber housing	1 x IP 68 cable gland M20 x 1.5; 1 x blind stopper M20 x 1.5
– Double chamber housing	1 x IP 68 cable gland M20 x 1.5; 1 x blind stopper M20 x 1.5; 1 x blind stopper M16 x 1.5

[4] Depending on the version M12 x 1, according to DIN 43650, Harting, Amphenol-Tuchel, 7/8" FF.

Connection cable	
– Wire cross-section	0.5 mm² (AWG 20)
– Wire resistance	< 0.036 Ω/m
– Tensile strength	< 1200 N (270 lbf)
– Standard length	5 m (16.4 ft)
– Max. length	1000 m (3280 ft)
– Min. bending radius	25 mm (0.984 in) with 25 °C (77 °F)
– Diameter approx.	8 mm (0.315 in)
– Colour - standard PE	Black
– Colour - standard PUR	Blue
– Colour - Ex-version	Blue

Indicating and adjustment module

Voltage supply and data transmission	through the sensor
Indication	LC display in Dot matrix
Adjustment elements	4 keys
Protection	
– unassembled	IP 20
– mounted into the sensor without cover	IP 40
Materials	
– Housing	ABS
– Inspection window	Polyester foil

Voltage supply

Supply voltage	
– Non-Ex instrument	9 … 32 V DC
– EEx-ia instrument	9 … 24 V DC
Supply voltage with lighted indicating and adjustment module	
– Non-Ex instrument	12 … 32 V DC
– EEx-ia instrument	12 … 24 V DC
Power supply by/max. number of sensors	
– DP/PA segment coupler	max. 32 (max. 10 with Ex)
– VEGALOG 571 EP card	max. 15 (max. 10 with Ex)

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Electrical protective measures	
Protection, depending on housing version	
– Plastic housing	IP 66/IP 67
– Aluminium housing, stainless steel housing - investment casting, stainless steel housing - electro-polished	IP 66/IP 68 (0.2 bar)[5]
– Aluminium and stainless housing, investment casting (optionally available)	IP 66/IP 68 (1 bar)
Overvoltage category	III
Protection class	II

Approvals[6]	
Approvals	
– ATEX ia	ATEX II 1G, 1/2G, 2G EEx ia IIC T6
– ATEX ia+d	ATEX II 1/2G, 2G EEx d ia IIC T6
– FM	FM Cl.I, Div 2 (NI)+Cl.II, III, Div 1 (DIP); FM Cl.I-III, Div 1 (IS); FM Cl.I-III, Div 1 (IS)+Cl.I-III, Div 1 Gr.C-G(XP)
– CSA	CSA Cl.I, Div 2 (NI)+Cl.II, III, Div 1 (DIP); CSA Cl.I-III, Div 1 (IS); CSA Cl.I-III, Div 1 (IS)+Cl.I-III, Div 1 Gr.C-G(XP)
– Ship approvals	

[5] A suitable cable is the prerequisite for maintaining the protection class.
[6] Deviating data in Ex applications: see separate safety instructions.

10.2 Profibus PA

Instrument master file

The instrument master file (GSD) contains the characteristic data of the Profibus PA instrument. These data are, e.g. the permissible transmission rates as well as information on diagnostics values and the format of the measured value outputted by the PA instrument.

A bitmap file is also provided for the Profibus network planning tool. This file is installed automatically when the GSD file is integrated. The bitmap file is used for symbolic indication of the PA instrument in the configuration tool.

Ident number

Each Profibus instrument gets an unambiguous ident number (ID number) from the Profibus user organisation (PNO). This ID number is also included in the name of the GSD file. For VEGAFLEX 67 the ID number is **0 x 0771(hex)** and the GSD file **FX__0771.GSD**. Optionally to this manufacturer-specific GSD file, PNO provides also a general so-called profile-specific GSD file. For VEGAFLEX 67 you have to use the general GSD file **PA139700.GSD**. If the general GSD file is used, the sensor must be set to the profile-specific ident number via the DTM software. By default, the sensor operates with the manufacturer-specific ID number.

Cyclical data traffic

The master class 1 (e.g. PLC) cyclically reads out measured values from the sensor during operation. The below block diagram below shows which data can be accessed by the PLC.

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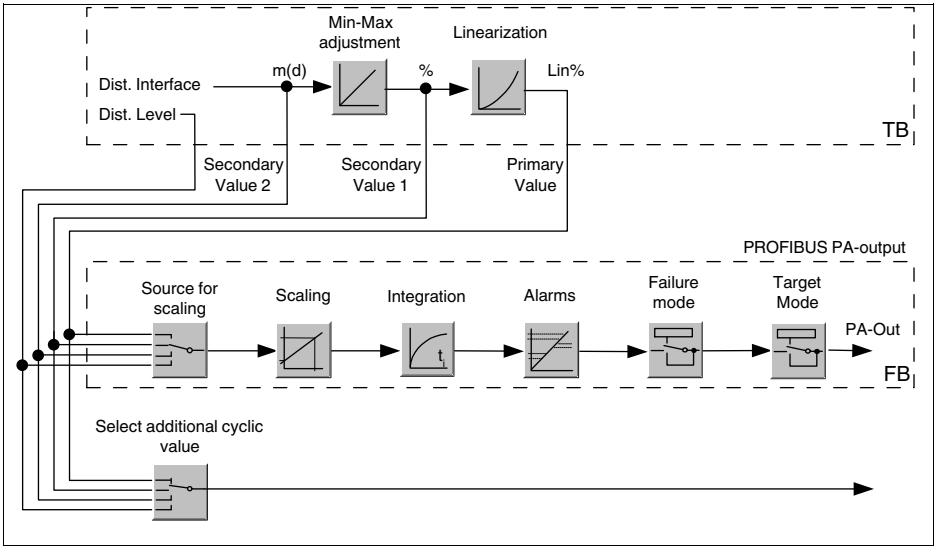

Fig. 23: VEGAFLEX 67: Block diagram with AI (PA-OUT) value and additional cyclical value
TB Transducer Block
FB Function Block

Module of the PA sensors

For the cyclic data traffic, VEGAFLEX 67 provides the following modules:

- AI (PA-OUT)

– PA-OUT value of the FB1 after scaling

- Additional Cyclic Value

– Additional cyclical value (depending on the source)

- Free Place

– This module must be used if a value should not be used in the data telegram of the cyclical data traffic (e.g. replacement of the Additional Cyclic Value)

Max. three modules can be active. By means of the configuration software of the Profibus master, you can determine the configuration of the cyclical data telegram with these modules. The procedure depends on the respective configuration software.

Note:

The modules are available in two versions:

- Short for Profibus master supporting only one "Identifier Format" byte, e.g. Allen Bradley
- Long for Profibus master only supporting the "Identifier Format" byte, e.g. Siemens S7-300/400

Examples of telegram configuration
In the following you will see how the modules can be combined and how the appendant data telegram is structured.

Example 1 (standard setting) with distance value and additional cyclical value:

- AI (PA-OUT)
- Additional Cyclic Value

Byte-No.	1	2	3	4	5	6	7	8	9	10
Format	IEEE-754-Floating point value				Status	IEEE-754-Floating point value				Status
Value	PA-OUT (FB1)				Status (FB1)	Additional Cyclic Value				Status

Example 2 with distance value without additional cyclical value:

- AI (PA-OUT)
- Free Place

Byte-No.	1	2	3	4	5
Format	IEEE-754-Floating point value				Status
Value	PA-OUT (FB1)				Status (FB1)

Data format of the output signal

Byte4	Byte3	Byte2	Byte1	Byte0
Status	Value (IEEE-754)			

Fig. 26: Data format of the output signal

The status byte corresponds to profile 3.0 "Profibus PA Profile for Process Control Devices" coded. The status "Measured value OK" is coded as 80 (hex) (Bit7 = 1, Bit6 … 0 = 0).

The measured value is transferred as a 32 bit floating point number in the IEEE-754 format.

Byte n								Byte n+1								Byte n+2								Byte n+3							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
VZ	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}	2^{-3}	2^{-4}	2^{-5}	2^{-6}	2^{-7}	2^{-8}	2^{-9}	2^{-10}	2^{-11}	2^{-12}	2^{-13}	2^{-14}	2^{-15}	2^{-16}	2^{-17}	2^{-18}	2^{-19}	2^{-20}	2^{-21}	2^{-22}	2^{-23}
Sign Bit	Exponent							Significant								Significant								Significant							

Value = $(-1)^{VZ} \bullet 2^{(Exponent - 127)} \bullet (1 + Significant)$

Fig. 27: Data format of the measured value

Coding of the status byte associated with the PA output value

Status code	Description according to Profibus standard	Possible cause
0x00	bad - non-specific	Flash-Update active
0x04	bad - configuration error	• Adjustment error • Configuration error with PV-Scale (PV-Span too small) • Unit irregularity • Error in the linearization table
0x0C	bad - sensor failure	• Hardware error • Converter error • Leakage pulse error • Trigger error
0x10	bad - sensor failure	• Measured value generation error
0x1f	bad - out of service constant	"Out of Service" mode switched on
0x44	uncertain - last unstable value	Failsafe replacement value (Failsafe-Mode = "Last value" and already valid measured value since switching on)
0x48	uncertain substitute set	• Switch on simulation • Failsafe replacement value (Failsafe-Mode = "Fsafe value")
0x4c	uncertain - initial value	Failsafe replacement value (Failsafe-Mode = "Last valid value" and no valid measured value since switching on)
0x51	uncertain - sensor; conversion not accurate - low limited	Sensor value < lower limit
0x52	uncertain - sensor; conversion not accurate - high limited	Sensor value > upper limit
0x80	good (non-cascade) - OK	OK
0x84	good (non-cascade) - active block alarm	Static revision (FB, TB) changed (10 sec. active, after the parameter of the static category was written)
0x89	good (non-cascade) - active advisory alarm - low limited	Lo-Alarm

Status code	Description according to Profibus standard	Possible cause
0x8a	good (non-cascade) - active advisory alarm - high limited	Hi-Alarm
0x8d	good (non-cascade) - active critical alarm - low limited	Lo-Lo-Alarm
0x8e	good (non-cascade) - active critical alarm - high limited	Hi-Hi-Alarm

10.3 Dimensions

Housing in protection IP 66/IP 67 and IP 66/IP 68; 0.2 bar

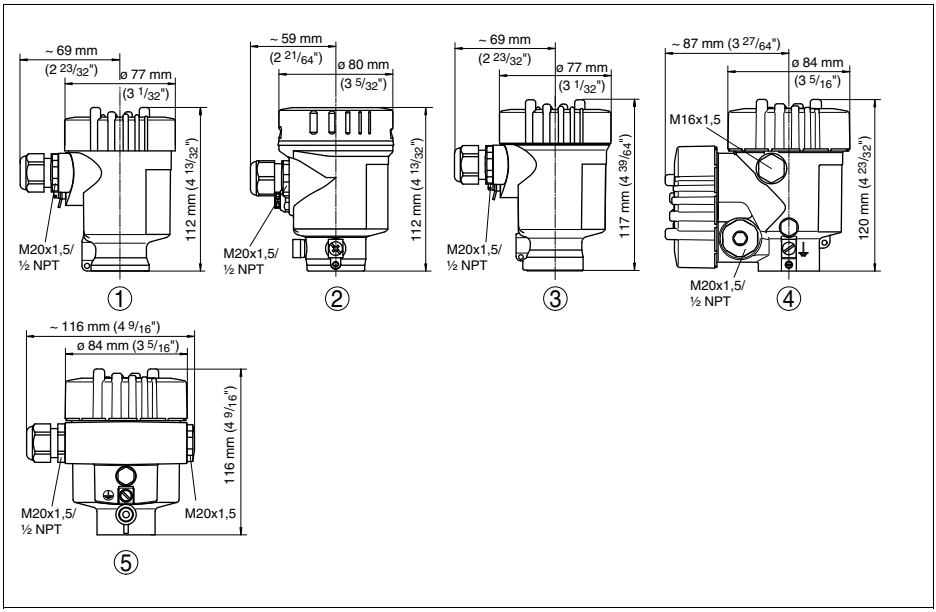

Fig. 28: Housing versions in protection IP 66/IP 67 and IP 66/IP 68, 0.2 bar (with integrated indicating and adjustment module the housing is 9 mm/0.35 in higher)

1 *Plastic housing*
2 *Stainless steel housing, electropolished*
3 *Stainless steel housing - precision casting*
4 *Aluminium double chamber housing*
5 *Aluminium housing*

Housing in protection IP 66/IP 68, 1 bar

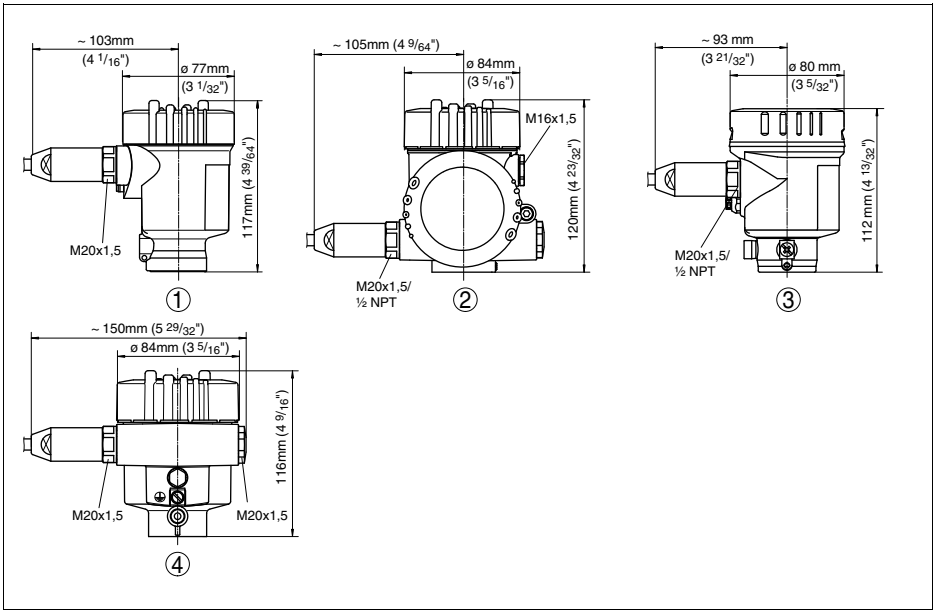

Fig. 29: Housing versions in protection IP 66/IP 68, 1 bar (with integrated indicating and adjustment module the housing is 9 mm/0.35 in higher)

1 Stainless steel housing - precision casting
2 Aluminium double chamber housing
3 Stainless steel housing, electropolished
4 Aluminium housing

VEGAFLEX 67

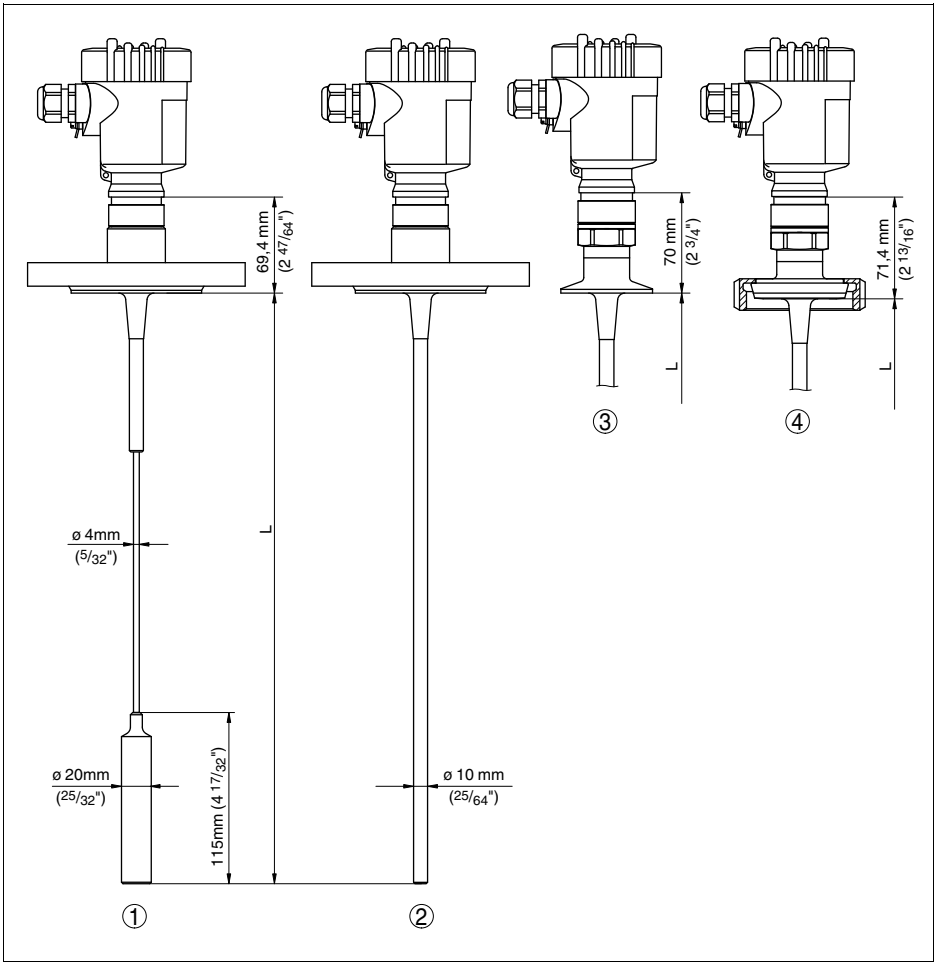

Fig. 30: VEGAFLEX 67 - flange version
L Sensor length, see chapter "Technical data"
1 Cable version with flange connection
2 Rod version with flange connection
3 Tri-Clamp
4 Bolting

10.4 Industrial property rights

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